



Life Cycle Step Dictionary

This appendix provides an example of a life cycle step dictionary.

Class: WS

Step Number: 1

Step Title: Phase 1 Work Plan

Step Information: This task includes all activities required to prepare, review, revise, and approve a Phase 1 Work Plan. A work plan contains the following information: an introduction, a detailed description of the waste site (including physical setting), the initial evaluation, the work plan rationale, and a detailed analysis of the proposed characterization activities.

Class: WS

Step Number: 2

Step Title: Phase I Characterization

Step Information: This task includes all field work and laboratory analysis to characterize a waste site in accordance with the work plan. Included in this task are subcontractor mobilization, well drilling, media sampling, geo/hydrogeological investigations, and disposal of investigation derived waste.

Activities:

1. Mobilization to the Field, Vegetation Removal, and Site Preparation.
2. Characterization Support—Complete characterization activities in accordance with the Phase II Work plan. ER exempt and non-exempt labor will be used to provide oversight and compile and validate characterization data.
3. Biota/Vegetative Sampling—SRTC will perform sampling of aquatic and terrestrial biota and vegetation for the ecological risk portion of the Baseline Risk Assessment. This work is important to assess the potential for biotransfer of contamination into the environment.
4. Biota/Vegetative Sample Analysis—SRTC and the Environmental Monitoring Section will prepare samples of vegetation and biota, and perform chemical analyses of the samples. Analyses will consist of radionuclide and metals analyses.
5. Technical Field Oversight—The subcontractor will provide technical field oversight, sample collection, field and laboratory data validation, sample preservation and storage, limited data interpretation, and documentation of all aspects of the field characterization.
6. Well Installation and Soil Borings—Well drilling and soil sampling services will be supplied by subcontractors (drilling rigs and drilling personnel).
7. Analytical Laboratory—A subcontracted analytical laboratory will be responsible for analyzing the bulk of the soil and water samples associated with the characterization. Analyses will consist of radionuclides, volatiles, or metals. Separate offsite laboratories will be used for a percentage of the groundwater, semi-volatile analyses of non-radioactive soil samples, and various QA related samples.

Class: WS



Step Number: 2

Step Title: Phase II Work Plan

Step Information: This task includes all activities required to prepare, review, revise, and approve a Phase II Work Plan. A work plan contains the following information: an introduction, a detailed description of the waste site (including physical setting), the initial evaluation, the work plan rationale, and a detailed analysis of the proposed characterization activities.

Class: WS

Step Number: 4

Step Title: Phase II Work Plan

Step Information: This task includes all activities required to prepare, review, revise, and approve a Phase II Work Plan. A work plan contains the following information: an introduction, a detailed description of the waste site (including physical setting), the initial evaluation, the work plan rationale, and a detailed analysis of the proposed characterization activities.

Activities:

1. Mobilization to the Field, Vegetation Removal, and Site Preparation.
2. Characterization Support—Complete characterization activities in accordance with the Phase II Work plan. ER exempt and non-exempt labor will be used to provide oversight and compile and validate characterization data.
3. Biota/Vegetative Sampling—SRTC will perform sampling of aquatic and terrestrial biota and vegetation for the ecological risk portion of the Baseline Risk Assessment. This work is important to assess the potential for biotransfer of contamination into the environment.
4. Biota/Vegetative Sample Analysis—SRTC and the Environmental Monitoring Section will prepare samples of vegetation and biota, and perform chemical analyses of the samples. Analyses will consist of radionuclide and metals analyses.
5. Technical Field Oversight—The subcontractor will provide technical field and storage, limited data interpretation, and documentation of all aspects of the field characterization.
6. Well Installation and Soil Borings—Well drilling and soil sampling services will be supplied by subcontractors (drilling rigs and drilling personnel).
7. Analytical Laboratory—A subcontracted analytical laboratory will be responsible for analyzing the bulk of the soil and water samples associated with the characterization. Analyses will consist of radionuclides, volatiles, or metals. Separate offsite laboratories will be used for a percentage of the groundwater, semi-volatile analyses of non-radioactive soil samples, and various QA related samples.



Appendix B

Class: WS

Step Number: 5

Step Title: Interim Actions

Step Information: This task is the action required to remove an immediate health or environmental risk or to remove materials that obstruct characterization. This task includes review, ground penetrating radar, magnetometer, electromagnetic survey, and removal actions in accordance with regulatory requirements.

Class: WS

Step Number: 7

Step Title: RI Summary Report

Step Information: This task includes all efforts related to the preparation of findings of the Remedial Investigation once data has been evaluated. Activities include preparing the site characterization summary, presenting the data, preparation, review, and approval of the report.

Activities:

1. Preparation of RI Summary Report–Subcontractors will assist ER personnel in the preparation of a RI Summary Report for the operable unit. The preparation includes: investigation summaries, discussion of the physical characteristics of the unit, discussion of the investigation findings, discussion of the modeling associated with the BRA, discussion of the BRA findings, summary and conclusions. The task also includes the development of various draft and final documents.
2. RI Summary Support–ER exempt and non-exempt labor will supply the oversight support, compile the reports, and forward work to EPA/SCDHEC for review and approval.
3. EPA/SCDHEC RI Summary Report Review–This period is allocated for regulatory review of the RI Summary Report.
4. RI Summary Report Revision–This period is allocated to revise the Remedial Investigation Summary Report. Subcontractors will assist ER personnel in the preparation of a revised RI Summary Report based on the regulators comments.
5. EPA/SCDHEC approval of RI Report–This is a period during which the EPA/SCDHEC will approve the RI Summary Report.

Class: WS

Step Number: 8

Step Title: Baseline Risk Assessment

Step Information: This task includes all efforts associated with performing an evaluation of the potential hazards at the waste site. The task includes work on the assessment of exposure, toxicity, and characterization of risk to human health and the environment.

Activities:

1. Preparation of BRA–Subcontractors will assist ER personnel in the preparation of a Baseline Risk Assessment for the operable unit. This work will consist of Groundwater and vadose zone fate and



transport modeling studies, development of COC and Receptor Scenarios, Hazard Assessment, Toxicity Assessment, Risk Characterization, and the development of various draft and final documents.

2. BRA Support–The Savannah River Technology Center (SRTC) will be responsible for providing technical input, review, and comment response support as requested by the Environmental Restoration Department.

3. EPA/SCDHEC Review BRA Regulatory–This period is allocated for regulatory review of the BRA Report.

4. Revision of BRA–This period is allocated to revise the BRA Report. Subcontractors will assist ER personnel in the preparation of a revised BRA based on the regulator's comments.

5. EPA/SCDHEC approval of BRA–This is a period during which the EPA/SCDHEC will approve the Baseline Risk Assessment.

Class: WS

Step Number: 9

Step Title: Feasibility Study

Step Information: The Feasibility Study will include a preliminary screening of technologies for applicability to this waste unit, development and screening of alternatives, and detailed analysis of alternatives. The technologies will be analyzed based on nine CERCLA criteria which include health risk, cost, and technical applicability. Results of the treatability study (if required) and the risk evaluation of remedial alternatives will be used in the screening and analysis.

Activities:

1. Feasibility Study (FS) Support–An initial screening of remedial alternatives will be completed based on the initial characterization data. This initial screening may be revised when additional characterization data becomes available. Environmental Restoration (ER) Engineering personnel as well as ER programmatic support personnel (as needed) will be included in this activity. The ER Engineering personnel will provide task team leadership, technical management and oversight, and document review and approval. The ER Engineering personnel will also develop the document review and approval. The ER Engineering personnel will also develop the FS. The FS will be forwarded for internal review (WSRC-ER) WSRC-EPD, DOE-SR, etc.) and the FS will be revised by ER personnel based on the internal comments received. The FS will then be submitted to the regulators for review.

2. Feasibility Study–The results of the risk evaluation of remedial alternatives (RERA), which evaluates the reduction in human health risk associated with the different remedial alternatives (RERA) identified, will be included in the FS. Site Geotechnical Services (SGS, formerly Systems Engineering (SE) will prepare the RERA.

3. Regulatory Review of Feasibility Study–Per the Federal Facilities Agreement (FFA), the regulators will review and comment on the FS.



4. **Revise Feasibility Study**—The document will be revised by ER personnel based on regulatory comments received. The revised document will be submitted for internal review before being submitted to the regulators. A comment response package will also be developed during this time. The FS and comment response package will be submitted after receipt of the regulatory comments.

5. **Feasibility Study Approval**—The regulators will review and approve the revised FS document.

Class: WS

Step Number: 10

Step Title: Treatability Studies

Step Information: This task includes the efforts required to prepare and conduct either a conceptual (lab), bench-scale, or pilot-scale study. These activities include the preparation or amendment of the treatability study work plan, procurement, sample analysis, design activities, equipment assembly, performance of the test, and preparation of Treatability Study Interim Action Proposed Plan (IAPP) and Treatability Study Interim Record of Decision (IROD).

Activities:

1. **Treatability Study Support**—ER Engineering personnel as well as ER programmatic support personnel (as needed) will be included in this activity. The ER Engineering personnel will provide task team leadership, STR management and oversight, and document review and approval.

2. **Treatability Study Work Plan Development**—The Treatability Study Work Plan will be developed by the Savannah River Technology Center (SRTC) and an ER Engineer and forwarded for internal review (WSRC-ER, WSRC-EPD, DOE-SR, etc.). The document will be revised based on the comments received before being submitted to the regulators. The engineer will also provide technical oversight.

3. **Regulatory Review of Treatability Study Work Plan**—The regulators will review and comment on the Treatability Study Work Plan.

4. **Revise Treatability Study Work Plan**—The Treatability Study Work Plan will be revised by ER personnel and SRTC based on regulatory comments received. The revised work plan will be submitted for internal review before being submitted to the regulators. A comment response package will also be developed during this time. The Treatability Study Work Plan and comment response package will be submitted after receipt of the regulatory comments.

Class: WS

Step Number: 11

Step Title: Additional Studies

Step Information: This task includes efforts required to increase the available data about a waste site. These activities may include a study to assess the effects of a waste site on a nearby stream.



Appendix B

Class: WS

Step Number: 12

Step Title: Additional Characterization

Step Information: This task involves additional characterization efforts required to fully characterize the waste site after the approval of the initial investigation report. These activities may include well sampling, media sampling, alternative risk analysis, and targeted characterizations.

Class: WS

Step Number: 13

Step Title: Preliminary Engineering

Step Information: This task includes preliminary engineering requirements. They include developing baseline documentation such as the Functional Performance Requirements (FPR), the Functional Design Criteria (FDC), the conceptual design, and the project estimate. These efforts end upon project authorization.

Class: WS

Step Number: 14

Step Title: Regulatory Requirements

Step Information: This task includes the activities required to present the preferred closure alternative to the regulators for approval. This is in the form of a Proposed Plan and Record of Decision (ROD). The Proposed Plan document describes the preferred alternative for remediation in layman's terms. The ROD is the document that describes the remediation option agreed upon by the DOE, EPA, and SCDHEC. The task includes the preparation, issue, revision, and approval of regulatory documents. It may also include attendance at public meetings.

Activities:

1. Regulatory Requirements Support—ER Engineering personnel as well as ER programmatic support personnel (as needed) will be included in this activity. The ER Engineering personnel will provide task team leadership, Subcontract Technical Representative (STR) management and oversight, and document review and approval.
2. Draft Proposed Plan Development—The draft Proposed Plan will be developed by the subcontractor and routed to WSRC-ER, WSRC-EPD, and DOE-SR for review and comment. Upon receipt of comments, revisions will be made, and the document will be submitted to the regulators for review.
3. Regulatory Review of the Proposed Plan—The regulators will review and comment on the final draft Proposed Plan.
4. Revision of Proposed Plan—The final draft Proposed Plan will be revised based on the regulatory comments received. A comment response package will also be developed. The revised Proposed Plan and comment response package must be submitted after receipt of regulatory comments.
5. Proposed Plan Approval—The revised Proposed Plan will be submitted to the regulators for approval.
6. Proposed Plan Public Comment Period—The Proposed Plan will be made available to the public for



review. The public will have a chance to question the information that is contained in the Proposed Plan. A public meeting may be held in order to provide responses to the public's questions.

7. Draft ROD Development–The draft ROD will be developed by the subcontractor and routed to WSRC-ER, WSRC-EPD, and DOE-SR for review and comment. Upon receipt of comments, changes will be made to the draft document, and the document will be submitted to the regulators for review. A “Responsiveness Summary” is developed and added to the ROD based on comments received during the Proposed Plan public comment period.

8. Regulatory Review of the ROD–Regulatory Review of the ROD–Per the FFA, the regulators will review and comment on the final draft ROD.

9. Revision of ROD–The draft ROD will be revised based on the regulatory comments received. A comment response package will also be developed. The revised ROD and comment response package will have to be submitted after receipt of regulatory comments.

10. ROD Approval–The revised ROD will be submitted to the regulators for approval.

Class: WS

Step Number: 15

Step Title: Detailed Engineering & Preconstruction Activities

Step Information: This task includes all of the definitive design work, including writing the Site Safety and Health Plan, the obtaining of work permits, and all other activities necessary to begin construction.

Class: WS

Step Number: 16

Step Title: Construction

Step Information: This task includes activities such as mobilization, remediation performance, and demobilization. This activity ends when the Approval for Final Acceptance is received.

Class: WS

Step Number: 17

Step Title: Post-Construction Activities

Step Information: This activity includes the cost for the professional engineer to perform a closure certification, the final survey, and any other activities needed to complete the closure. This activity does not include post-closure monitoring and maintenance.



Appendix B

Class: WS

Step Number: 18

Step Title: Well Monitoring

Step Information: This task includes the cost to contract a laboratory to conduct quarterly groundwater analyses in compliance with SCDHEC/EPA regulations.

Class: WS

Step Number: 19

Step Title: Program Support

Step Information: This task includes the time required by Waste Site managers, an environmental specialist, technicians, and clerical personnel to support the activities being conducted for the waste sites. This includes, but is not limited to, management oversight for regulatory and preproject/project activities, cost account management for financial activities, acquisition of data from sampling activities, field liaison to Health Protection field representatives, data entry, evaluation of analytical data, transfer of data into usable form, support of the remedial technology selection process, assistance to subcontractors in characterization and assessment, and waste site inspections and follow-up.

Class: GW

Step Number: 2

Step Title: GW Characterization

Step Information: This task includes the efforts to mobilize resources, perform field work, laboratory analysis, and other activities to define groundwater and subsurface parameters. These activities include:

1. The Subsurface Characterization tasks will be performed by subcontractors to delineate the extent of contaminant plumes. The subsurface characterization will consist of the drilling and installation of monitor wells, and sampling (both Direct Push Technology (DPT) and Exploratory Borings (EB) along transect lines, along with soil gas work. Sampling and the analyses will aid in determining the extent of the contamination in this phase of the field investigation plan, and for input into the corrective action engineering designs.
2. Cone Penetration Technology (CPT) and Hydropunch—CPT and Hydropunch work will be performed as a portion of the Field Investigation Plan to support characterization and remediation activities.
3. Monitor wells will be installed in order to monitor the plume(s) of contamination at the MWMF.
4. Soil Analysis—Soil Analysis will be performed for source assessment.
5. Statistics—Savannah River Technology Center (SRTC) will perform statistics on the data from the well sampling and analysis.
6. Pump / Injection Tests—Pump / Injection Tests will be performed to determine aquifer parameters needed for the design of the remediation treatment facility.
7. Extraction Well(s)—Extraction Well(s) will be installed and tested to determine the rates at which the contaminated groundwater may be extracted for treatment.
8. Piezometers will be installed by a subcontractor to assist in pumping tests for aquifer



characterization as a support in the Remediation effort.

Class: GW

Step Number: 4

Step Title: Modeling

Step Information: This task includes the activities required to generate groundwater flow and transport models related to the hydrostratigraphy of the groundwater for subsurface and Remediation characterization. These computer generated models will support the assessment and corrective action phases of the groundwater Remediation program. Modeling will be needed throughout Phase 0 of the Corrective Action Plan implementation for calculating effects on the subsurface groundwater pathways with implementation of corrective action; i.e. optimization of well field layout, predicting the effectiveness of the CAP (short-term), evaluation of the other effects on the environment (wetland, facilities, and streams), and estimating the flow rates/capacities in the treatment system.

1. Modeling Support—An Environmental Restoration (ER) modeler will provide Modeling Support for the subsurface characterization studies.

2. Groundwater Modeling, final CAP—Groundwater Modeling will be required for the final CAP to assist in engineering Remediation design for corrective action. This modeling will be performed by a subcontractor.

3. Remediation Modeling—Remediation Modeling will need to be performed as an ongoing effort during Remediation design to assist in engineering implementation and operation of the treatment system, to assess effectiveness of the system, and effects on the aquifers and confining units.

Class: GW

Step Number: 5

Step Title: Human Health & Ecological Studies

Step Information: This task includes the characterization of contamination and associated ecological impacts, determination of exposure pathways and scenarios and quantification of risks associated with the contaminants of concern. Major objectives include characterization of the distribution of contamination in surface waters, soils and sediments, and biota in the vicinity, providing information required to model the fate and transport of discharged contaminants, and providing a basis for determining the source of the observed contamination.

1. Human Health Support—The human health risk assessor will also be responsible for the integration with work plans, feasibility studies, proposed plans and the ROD.

2. Ecological Support—An ER Ecologist will support the ecological aspects in the assessment of risk from contaminated groundwater. The ecological risk assessor will also be responsible for the input/approval of the ecological integration with work plans, feasibility studies, proposed plans and ROD. A final risk assessment will be required after more ecological and well data are acquired for health and ecological evaluation.

3. Bi-Annual Wetlands Sampling—Bi-Annual Wetlands Sampling will be performed by a subcontractor. The chemical analyses of the samples will be performed by a subcontractor in the activity below. The samples will be taken twice in a twelve month period to provide a spring and fall sampling.

4. Wetland Chemical Analyses—A subcontractor will provide the analyses for the wetland samples taken in the activity above. The analyses will be episodic in nature corresponding to the spring and fall sampling.



5. Soil, Sediment and Water Sampling—Soil, Sediment and Water Sampling will be conducted to better delineate the impact to the soil, sediment and water in the near vicinity. This is a one-time event and will determine if further sampling might be required.

Class: GW

Step Number: 6

Step Title: Feasibility Studies

Step Information: This task includes efforts to select remedial alternatives to undergo full evaluation as well as the detailed analysis of these alternatives. Alternatives are evaluated on the basis of short and long term effectiveness, reduction of toxicity/mobility, implementability and cost. This task is divided into three subtasks: development and screening of potential technologies, assessment of risk of alternatives, and conducting a detailed analysis of selected alternatives.

Class: GW

Step Number: 7

Step Title: Treatability Studies

Step Information: This task is conducted to evaluate technology feasibility or provide engineering parameters for corrective action system design or procurement.

Class: GW

Step Number: 8

Step Title: Additional Studies/Characterizations

Step Information: These tasks include activities that are performed to increase the available data about a site in support of preparing regulatory decision documents or engineering designs. Some examples may include system optimization and engineering alternative studies.

Class: GW

Step Number: 9

Step Title: Regulatory Requirements

Step Information: This task includes preparing, reviewing, and revising all regulatory decision documents associated with a project. Renewals of regulatory decision documents are also covered under this step. Process permitting, such as NPDES permitting, is covered under the engineering phases of the project.



Appendix B

Class: GW

Step Number: 10

Step Title: Preliminary Engineering

Step Information: This task includes preliminary engineering requirements as identified in DOE Order 4700.1. It includes developing baseline documentation such as the Functional Performance Requirements (FPR), the Functional Design Criteria (FDC), the conceptual design, and the project estimate. These efforts end upon project authorization.

Class: GW

Step Number: 11

Step Title: Detailed Engineering & Preconstruction

Step Information: This task includes all of the definitive design work, the writing of the Site Safety Health Plan, the obtaining of work permits, and all other activities necessary to begin construction.

Class: GW

Step Number: 12

Step Title: Construction

Step Information: This task includes the activities such as, mobilization, performing the Remediation, and demobilization. The activity ends when the Approval for Final Acceptance is received.

Class: GW

Step Number: 13

Step Title: Post Construction Activities

Step Information: This activity includes the cost for the final survey and any other activities needed to complete the Remediation. This activity does not include post closure monitoring and maintenance.

Class: GW

Step Number: 14

Step Title: Operations

Step Information: This task includes the materials and labor necessary for onsite organizations to operate Environmental Restoration Remediation systems. This includes facility operations, preventive maintenance, and maintenance not requiring a cost project to implement.



Appendix B

- Class: GW
- Step Number: 15
- Step Title: Project Management and Support
- Step Information: This task includes project management activities to include clerical, budget management tasks, and technical support. Routine well monitoring and analysis is also included. These activities include:
1. The Project Team Engineer develops and manages project costs, scope and schedules. These tasks coupled with development of the Annual Operating Plan (AOP) and the Five Year Plan (FYP), make up a majority of the responsibilities of the conducting/preparing monthly performance analysis reports, development of outyear budget validation documentation, and management of activities/funding provided to support organizations.
 2. The Cost Account Manager (CAM) is responsible for the overall management of the ADS. Also included is the timely delivery of award fee deliverables. The CAM is also responsible for the timely submission of all regulatory requirements, and to interface with DOE counterparts.
- Class: GW
- Step Number: 17
- Step Title: Start-Up
- Step Information: Start-Up activities ensure that constructed facilities are functional and acceptable for operation. Component tests and/or checks are conducted to assure the adequacy of component design, and its installation, material, and workmanship prior to and during the system testing phase. System and facility tests combine components to verify that individual systems, and the facility as a whole, perform as specified. Analyses may be performed to ensure the success of the facility and systems tests. Efforts from Environmental Restoration, Start-Up Engineering, and Reactor Materials are included in this lifecycle step.
- Class: GW
- Step Number: 18
- Step Title: Maintenance
- Step Information: This task includes any routine and non-routine maintenance activities and process enhancements that require a cost project to implement and complete.
- Class: GW
- Step Number: 19
- Step Title: Compliance Support
- Step Information: This step includes any activities required to satisfy regulatory and non-regulatory requirements during the operations phase. This includes, but is not limited to, RCRA Part B Permit 5 Year Updates, Installing and removing monitoring wells, and producing updated groundwater models.



Appendix B: Life Cycle Step Dictionary